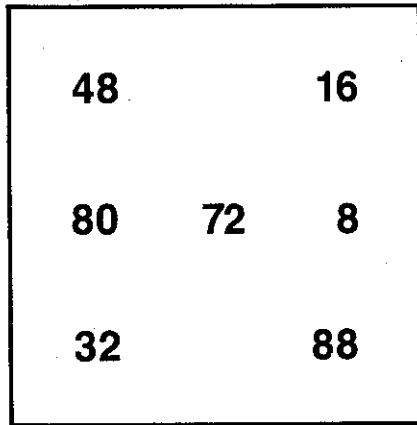


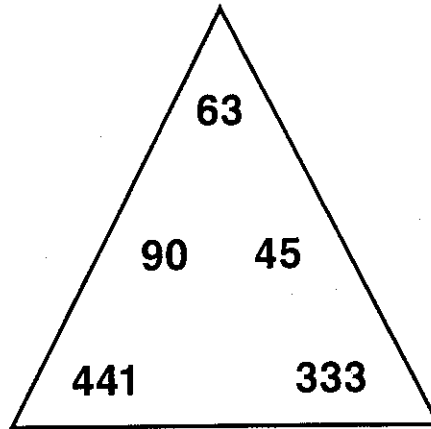
COMMON PROPERTY PATTERNS



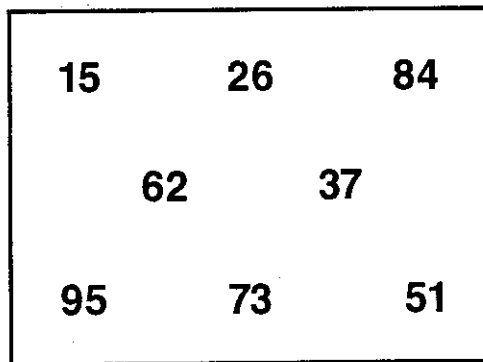
Look at the number in each shape.
What do the numbers have in common?



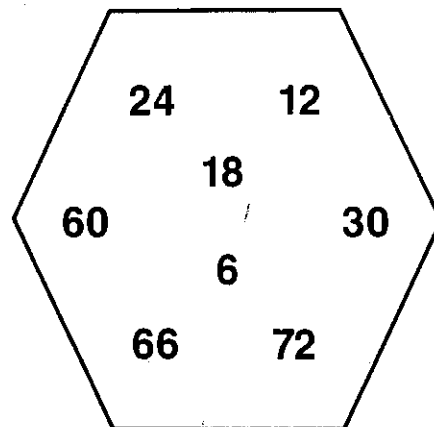
1. _____



2. _____

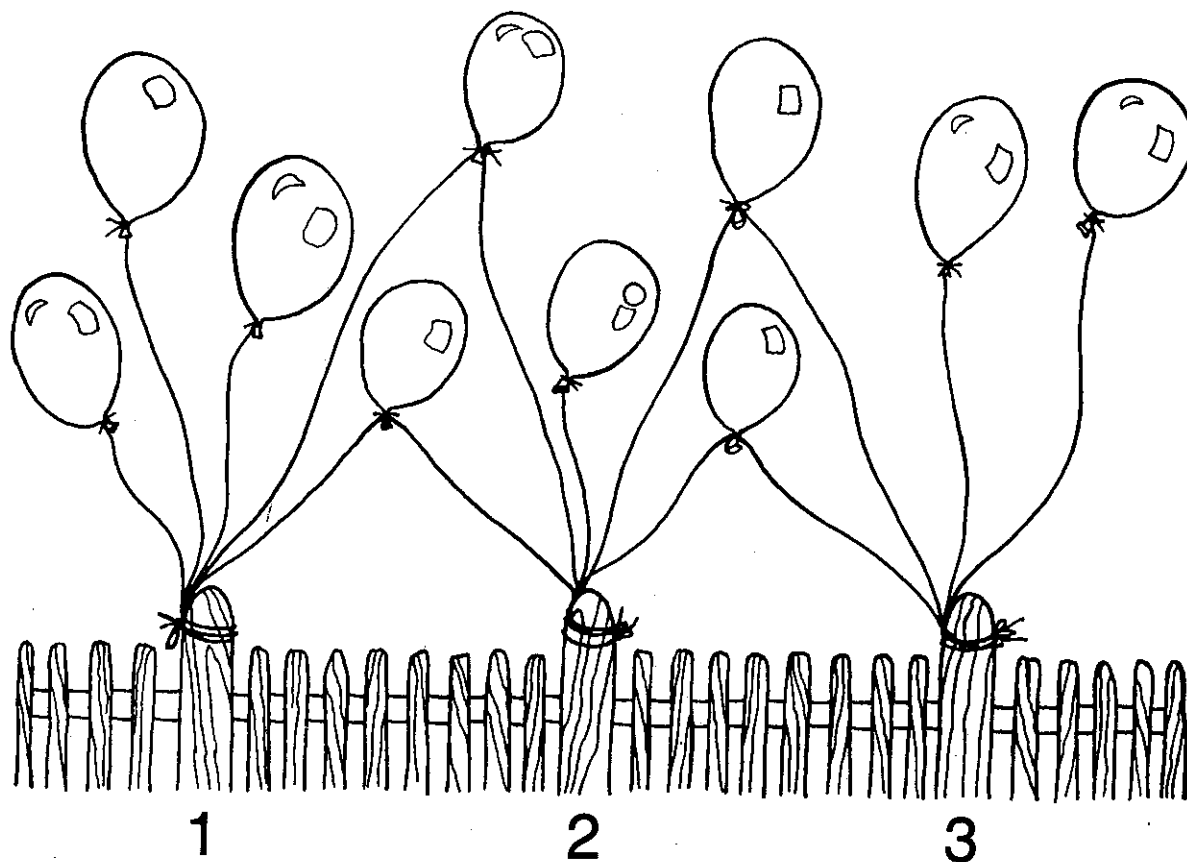


3. _____



4. _____

STRINGS ATTACHED



How many balloons are tied to:

1. two different posts? _____
2. both posts 1 and 2? _____
3. both posts 2 and 3? _____
4. post 1 only? _____
5. post 2 only? _____
6. post 3 only? _____
7. post 2 or post 3 only? _____
8. post 1 or post 2 only? _____

TABLE LOGIC



Each member of the Sanchez family always sits in the same place at dinner. The Sanchez children are Juan, Isabel, Maria, and Ramon. Use the facts below to help locate where family members sit.

Mrs. Sanchez sits opposite Mr. Sanchez.

Juan sits opposite Maria.

Ramon sits on Mr. Sanchez's right.

Maria sits on Mrs. Sanchez's left.

Answer these questions.

1. Who sits to the right of Juan? _____
2. Who sits opposite Ramon? _____
3. Who sits between Mrs. Sanchez and Ramon? _____
4. Who sits to the right of Isabel? _____
5. Who sits between Juan and Ramon? _____
6. Who sits on Maria's left? _____
7. Who sits opposite Isabel? _____
8. Who sits to the right of Maria? _____



NUMBER SENTENCES



Make the number sentences true. Write 2, 4, or 5 in each circle, but use each number only once in a problem.

1. $\bigcirc - \bigcirc = 1$

2. $\bigcirc - \bigcirc = 2$

3. $\bigcirc - \bigcirc = 3$

4. $\bigcirc + \bigcirc - \bigcirc = 1$

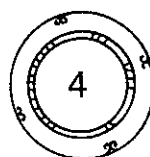
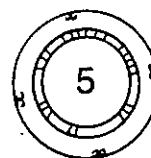
5. $\bigcirc + \bigcirc - \bigcirc = 3$

6. $\bigcirc + \bigcirc - \bigcirc = 7$

7. $\bigcirc \times \bigcirc - \bigcirc = 3$

8. $\bigcirc \times \bigcirc - \bigcirc = 6$

9. $\bigcirc \times \bigcirc - \bigcirc = 18$



FAVORITE SUBJECT



The four children in the Smith family each have a different favorite subject in school. Use the information given below to find out which subject each person likes best. Complete the chart. Mark an X in a square when it cannot be the answer. Mark an O to show the favorite subject.








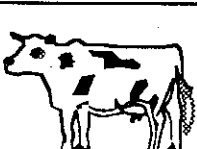
1. Math is not Bill's favorite subject.
2. Sue doesn't like to read.
3. Sally likes art better than writing.
4. Bob's favorite subject is math.
5. Sally likes reading better than art.
6. Bill prefers writing to art.

| Student | Reading | Art | Math | Writing |
|---------|---------|-----|------|---------|
| Bill | | | | |
| Sally | | | | |
| Bob | | | | |
| Sue | | | | |



OVER HERD



| | | | |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
|  Bessie |  Flossie |  Sadie |  Daisy |
|  Moozie |  Suzie |  Lucy |  Belle |

Can you name each cow?

- One cow was missing at feeding time. It was black and did not have spots or horns. Which cow was missing?

- The first cow to get to the water trough was white with spots and horns. Which cow was first?

- One sick cow was visited by the vet. Its white spotless coat seemed pink with fever. Even its horns were drooping. Which cow was ill?

- The cow that was usually first to be milked was black, with spots and without horns. Which cow was it?

- The cow that was usually last to be milked was black, with horns and without spots. Which cow was it?

- One cow won a blue ribbon at the county fair. It was white and had spots but no horns. Which cow won the blue ribbon?

- The white cow with spots and horns wears a bell around its neck. Which cow is it?

- Two cows were strolling in the barnyard. One was black, with spots and horns. The other was white, without spots or horns. What were their names?

- Two cows won red ribbons at the county fair. One cow was black, with horns and without spots. The other cow was black, with spots and without horns. Which cows won red ribbons?

NUMBER SENTENCES



Use each number disk only once to make the following number sentences true. Use all the disks.

1.

(2) (3) (5) (7) (8) (9)

$$\bigcirc + \bigcirc = \bigcirc$$

$$\bigcirc - \bigcirc = \bigcirc$$

2.

(1) (2) (3) (4) (5) (6) (7) (8) (15)

$$\bigcirc + \bigcirc = \bigcirc$$

$$\bigcirc - \bigcirc = \bigcirc$$

$$\bigcirc \times \bigcirc = \bigcirc$$

3.

(2) (3) (7) (8) (9) (10) (11) (16) (20)

$$\bigcirc + \bigcirc = \bigcirc$$

$$\bigcirc - \bigcirc = \bigcirc$$

$$\bigcirc \times \bigcirc = \bigcirc$$

4.

(4) (6) (7) (8) (9) (11) (15) (24) (36) (42) (60) (72)

$$\bigcirc + \bigcirc = \bigcirc$$

$$\bigcirc - \bigcirc = \bigcirc$$

$$\bigcirc \times \bigcirc = \bigcirc$$

$$\bigcirc \div \bigcirc = \bigcirc$$

NUMBER SHUFFLE



Make the number sentences true. Write 2, 3, or 6 in each circle, but use each number only once in a problem.

1. $\bigcirc + \bigcirc + \bigcirc = 11$

2. $\bigcirc + \bigcirc - \bigcirc = 7$

3. $\bigcirc + \bigcirc - \bigcirc = 5$

4. $\bigcirc \times \bigcirc + \bigcirc = 20$

5. $\bigcirc \times \bigcirc + \bigcirc = 15$

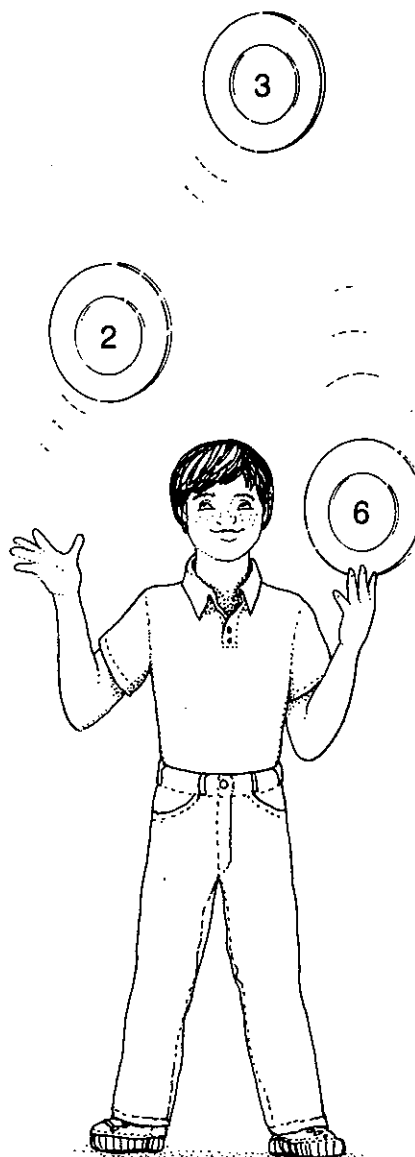
6. $\bigcirc \times \bigcirc + \bigcirc = 12$

7. $\bigcirc \times \bigcirc - \bigcirc = 16$

8. $\bigcirc \times \bigcirc - \bigcirc = 9$

9. $\bigcirc \times \bigcirc - \bigcirc = 0$

10. $\bigcirc \times \bigcirc \div \bigcirc = 9$



LETTER LOGIC



A, B, C, and D each stand for a different number from 1 to 9.

$$\begin{array}{r} A \\ + B \\ \hline CD \end{array}$$

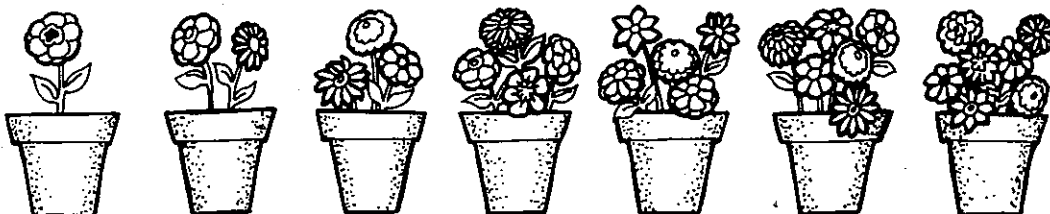
1. What number does C have to be? _____
2. If D is 6, then A is either _____ or _____.
3. If D is 7, then A is either _____ or _____.
4. If A is 4 and D is 2, then B is _____.
5. Why can't D be 1? _____

6. If A is 6 greater than B, then D is _____.

W, X, Y, and Z each stand for a different number from 1 to 9.

$$\begin{array}{r} W \\ + X \\ + Y \\ \hline Z \end{array}$$

1. If W is 2, X is 3, and Y is 4, then Z is _____.
2. If W is 1, X is 2, and Z is 7, then Y is _____.
3. If W is one greater than X, Y is 1, and Z is 8, then
 W is _____.
4. If X is two greater than W and two less than Y,
 then Z has to be _____.
5. What is the smallest number Z can be? _____
 Why? _____



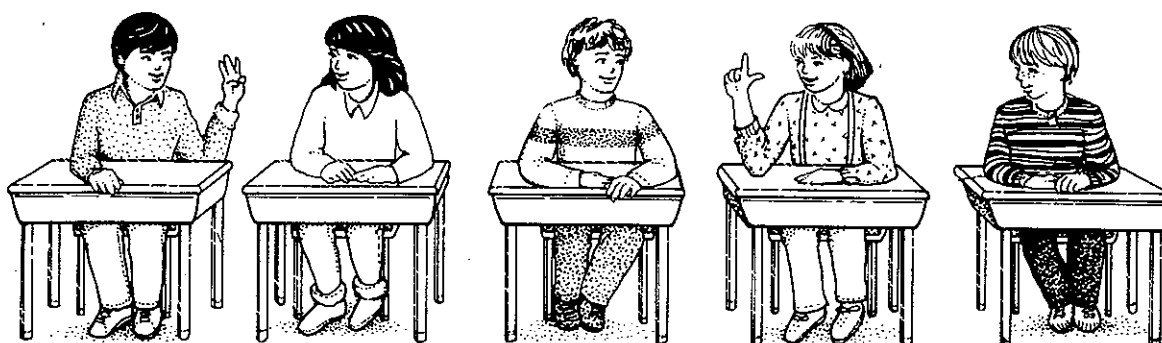
FAVORITE NUMBERS



One fifth-grade teacher asked her students their favorite numbers. Each person in the front row named a different number. Each number was a counting number less than 10. Use the information given below to find out each person's favorite number. Complete the chart. Mark an X in a square when it cannot be the answer. Mark an O to show the favorite number.

1. Bonnie, Victor, and Ruth all chose even numbers.
2. Simon and Dan chose odd numbers.
3. Bonnie's number was less than 4.
4. Victor's number was greater than 6.
5. Ruth's number was three times Bonnie's number.
6. Dan's number was half of Ruth's number.
7. Simon's number was the sum of Bonnie's and Dan's numbers.

| Student | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------|---|---|---|---|---|---|---|---|---|
| Simon | | | | | | | | | |
| Bonnie | | | | | | | | | |
| Victor | | | | | | | | | |
| Dan | | | | | | | | | |
| Ruth | | | | | | | | | |



DEDUCTIVE LOGIC



Five girls were walking to the park. They were all wearing blouses of different colors. Akiko, Betty, Clara, Dana, and Eve wore blouses that were red, green, blue, white, and yellow (but not necessarily in that order). Use the information given to determine what color blouse each girl wore. Complete the chart. Mark an X in a space when it cannot be the answer. Mark an O to show who wore which blouse.

1. Clara doesn't own a green blouse.
2. Dana hates the colors green and yellow.
3. Betty's blouse was either red or blue.
4. Akiko's blouse was neither green nor white.
5. Clara walked between the girl with the yellow blouse and the girl with the blue blouse.
6. Dana's blouse was red.

| | Red | Green | Blue | White | Yellow |
|-------|-----|-------|------|-------|--------|
| Akiko | | | | | |
| Betty | | | | | |
| Clara | | | | | |
| Dana | | | | | |
| Eve | | | | | |



NUMBER JUGGLING



Write 3, 4, or 12 in each circle to make the number sentences true. Use each number only once in a problem.

1. $\bigcirc + \bigcirc - \bigcirc = 13$
2. $\bigcirc \times \bigcirc - \bigcirc = 0$
3. $\bigcirc - \bigcirc - \bigcirc = 5$
4. $\bigcirc \times \bigcirc + \bigcirc = 24$
5. $\bigcirc \div \bigcirc + \bigcirc = 8$
6. $\bigcirc \div \bigcirc - \bigcirc = 0$
7. $\bigcirc \div \bigcirc \times \bigcirc = 9$
8. $\bigcirc \times \bigcirc \div \bigcirc = 1$
9. $\bigcirc \div \bigcirc \div \bigcirc = 1$
10. $\bigcirc \times \bigcirc \div \bigcirc = 9$
11. $\bigcirc \times \bigcirc - \bigcirc = 32$



Page 33, Calendar Patterns

| | | |
|----------------|-----------------|------------------|
| JANUARY | FEBRUARY | MARCH |
| S M T W T F S | S M | |
| 1 | 1 | 3 |
| 8 | 9 | |
| 15 | | 22 |
| 22 | | |
| 29 | | |
| APRIL | MAY | JUNE |
| | | |
| 7 | 9 | 5 |
| 11 | | 22 |
| 20 | | |
| 30 | | |
| JULY | AUGUST | SEPTEMBER |
| | (M) | (F) |
| 18 | 18 | 26 |
| 28 | | 26 |
| | | |
| OCTOBER | NOVEMBER | DECEMBER |
| 9 | 6 | 10 |
| 18 | 22 | 12 |
| 25 | | |

Page 34, Letter Combination Patterns

- 8 paths
- 2 paths
- 4 paths
- 8 paths
- 16 paths
- Answers will vary. Accept all correct student answers.

7.

| | | | | | | | |
|--------------------------------|---|---|---|----|----|----|-----|
| Number of letters in each word | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Number of paths | 2 | 4 | 8 | 16 | 32 | 64 | 128 |

Page 35, Patterns and Rules

- | | | | | | | |
|----|----|----|----|----|----|----|
| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |

Rule: Add 9.
- | | | | | | | |
|----|----|----|---|----|----|-----|
| 13 | 20 | 15 | 7 | 12 | 50 | 100 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 9 | 16 | 11 | 3 | 8 | 46 | 96 |

Rule: Subtract 4.
- | | | | | | | |
|----|----|----|----|----|----|-----|
| 5 | 17 | 9 | 11 | 25 | 31 | 100 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 10 | 34 | 18 | 22 | 50 | 62 | 200 |

Rule: Multiply by 2.
- | | | | | | | |
|----|----|----|----|----|----|-----|
| 9 | 5 | 15 | 8 | 11 | 13 | 100 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 45 | 25 | 75 | 40 | 55 | 65 | 500 |

Rule: Multiply by 5.
- | | | | | | | |
|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ |
| 3 | 5 | 7 | 9 | 11 | 13 | 15 |

Rule: Multiply by 2 and add 1.

Page 36, Counting Squares Patterns

1.

| Size of Square | Number of Squares With: | | | | | | Total Number of Squares |
|----------------|-------------------------|---------------|---------------|----------------|----------------|----------------|-------------------------|
| | 1-Square Unit | 4-Square Unit | 9-Square Unit | 16-Square Unit | 25-Square Unit | 36-Square Unit | |
| 1 × 1 | 1 | | | | | | 1 |
| 2 × 2 | 4 | 1 | | | | | 5 |
| 3 × 3 | 9 | 4 | 1 | | | | 14 |
| 4 × 4 | 16 | 9 | 4 | 1 | | | 30 |
| 5 × 5 | 25 | 16 | 9 | 4 | 1 | | 55 |
| 6 × 6 | 36 | 25 | 16 | 9 | 4 | 1 | 91 |

- Answers will vary. Accept all correct student answers.
- Add all the perfect squares from 1 to 100.

Page 37, Common Property Patterns

- They are multiples of 8.
- The sum of the digits for each number is 9.
- The digits of each number differ by 4.
- They are multiples of 6.

Page 38, Paper Strip Patterns

- d. one large loop
- 2 interconnected loops: 1 large and 1 small
- 2 large interconnected loops
- 3 interconnected loops: 2 large and 1 small
- 3 large interconnected loops
-

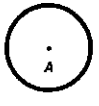
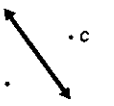
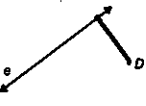
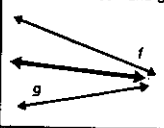
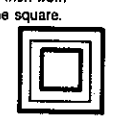

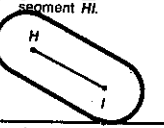
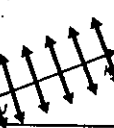
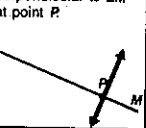
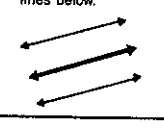
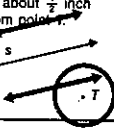
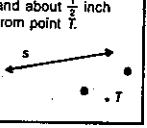
| | | | | | | | | |
|-----------------------|---|---|---|---|---|---|---|---|
| Number of Cuts | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Number of Large Loops | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| Number of Small Loops | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |

Page 39, Design Patterns

-
-
-

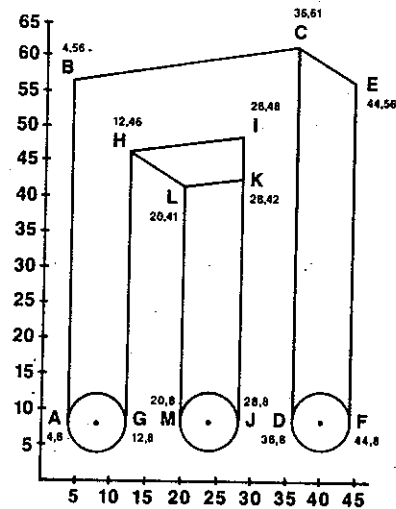
Page 101, Points and Lines

Answers may vary.

| | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. All points $\frac{1}{2}$ inch from point A.  | 2. All points the same distance from B and C.  | 3. The shortest route from point D to line e.  |
| 4. All points midway between lines f and g.  | 5. All points about $\frac{1}{8}$ inch from the square.  | 6. All points about $\frac{1}{8}$ inch from the figure.  |
| 7. All points about $\frac{1}{2}$ inch from segment HI.  | 8. Several lines perpendicular to JK.  | 9. One line perpendicular to LM at point P.  |
| 10. All points the same distance from the two lines below.  | 11. All points about $\frac{1}{2}$ inch from line s or about $\frac{1}{2}$ inch from point T.  | 12. All points about $\frac{1}{2}$ inch from line s and about $\frac{1}{2}$ inch from point T.  |

Page 102, Illusions

Answer will resemble this figure.



PART 3: LOGIC

Page 104, Strings Attached

- 4 balloons
- 2 balloons
- 2 balloons
- 3 balloons
- 1 balloon
- 2 balloons
- 3 balloons
- 4 balloons

Page 105, Oh Brother!

- Dave
- Dan
- Dick
- Don
- Dan

Page 106, Moo-ving Logic

- Bessie, Flossie, Sadie, Daisy
- Moozie, Suzie, Lucy, Belle
- Flossie, Daisy, Suzie, Belle
- Bessie, Flossie, Moozie, Suzie
- Sadie, Daisy, Lucy, Belle
- Sadie, Lucy
- Moozie
- Daisy
- Flossie, Suzie
- Belle

Page 107, Number Sense

- false
- false
- true
- true
- false
- true
- true

Page 108, Locating Letters

- R
- S
- W
- F
- W
- A
- M
- Y
- U
- E

Page 109, Letter Logic

$$A - 2 = B$$

- 7
- 2
- 7
- 12
- $A - B = 2$

$$X \times Y = Z$$

- 15
- 8
- 4
- 4
- Answers will vary: 7 or 5; 1 or 35

Page 110, Sets and Circles

- A
- C
- B
- D
- A
- D
- C
- B
- A
- C
- D
- B

Page 111, Comparing Symbols

- C
- D
- A and B
- Answers will vary. A Dean must have the same shape, in the same position, on either side. One shape will be filled in and the other will be open.

Page 112, State-A-Date

- April 2, 9, 16, 30
- February 3, 10, 17, 24
- August 5, 19, 26
- January 4, 11, 18, 25
- September 2, 9, 16, 23, 30
- May 5, 12, 19, 26
- November 4, 11, 18, 25
- March 7, 14, 21, 28
- January 1, 8, 15, 22, 29
- October 3, 10, 17, 24

Page 113, Order Sorter

- math $6 + 8 = 14$ end
- Is this all?
- Mathematics is the study of powerful, exciting and useful ideas.
- One, two, Hear the cow moo.
Three, four, I hope there's no more.
Five, six, Fiddlesticks.

Page 114, Table Logic

- Mr. Sanchez
- Isabel
- Maria
- Juan
- Mr. Sanchez
- Ramon
- Ramon
- Mrs. Sanchez

Page 115, Letter Perfect

- CATDOKL
- MADEBNTC
- TOURSPYMCB
- FACTORMHIN
- ANGLEPITR
- EQUALSRONT
- DISTANCEGRML
- EQUATIONFRMLCBS

9. RATIOSCUEVLM
10. ZERO DCIMALUTP

Page 116, Number Sentences

1. $5 - 4 = 1$ 2. $4 - 2 = 2$ 3. $5 - 2 = 3$
 4. $2 + 4 - 5 = 1$ 5. $5 + 2 - 4 = 3$ 6. $5 + 4 - 2 = 7$
 7. $4 \times 2 - 5 = 3$ 8. $5 \times 2 - 4 = 6$ 9. $5 \times 4 - 2 = 18$

Page 117, Favorite Games

1. 1 2. 7 3. 2 4. 6 5. 5

Page 118, Educated Guesses

1. 6; 14; 32; even 2. 16; 104; 28; even
 3. 15; 33; 71; odd 4. 6; 14; 28; even 5. 4;
 12; 36; even 6. 3; 11; 27; odd 7. 12; 136;
 128; even 8. 9; 77; 75; odd 9. even 10. odd
 11. even 12. odd 13. even 14. odd

Page 119, Letter Logic

A + 3 = B

1. 8 2. 7 3. 6 4. 3

X + Y + 2 = Z

1. 6 2. 9 3. 5 4. 4 5. 5

Page 120, Shifting Digits

1. 92 - 86 2. 654 - 13 3. 134 - 65
 4. 864 - 123 5. 412 - 386 6. 56×3 7. 53×6
 8. 32×81

Page 121, Finding Figures

| | Number |
|------------------------------|--------|
| Hexagon and pentagons in all | 3 |
| Squares inside circles | 2 |
| Circles inside squares | 1 |
| Triangles inside the octagon | 1 |
| Circles not inside circles | 2 |
| Polygons in all | 11 |
| Polygons not inside circles | 6 |
| Polygons inside circles | 5 |

Page 122, Finding Numbers

1. 57 2. 37 3. 27, 51, 57 4. 57 5. 53, 97
 6. 75 7. 27 8. 39

Page 123, Five-in-a-Row

1. D5 2. C8 or G4 3. O's

Page 124, How to Solve It

1. add the numbers, subtract the numbers
 2. choose the larger number 3. multiply the
 numbers, subtract the numbers 4. choose the
 smaller number 5. add the numbers, subtract the
 numbers 6. subtract the numbers 7. divide the
 numbers 8. multiply the numbers, add the numbers
 9. subtract the numbers, divide the numbers
 10. subtract the numbers, divide the numbers

Page 125, Letter Logic

A + B = C

1. 6 or 8 2. 7, 9 3. 4 or 8 4. 5 5. 6 6. 6

X + Y = Z

1. 9; 9 is the greatest one-digit number 2. 8; If X
 were 8 and Y were 1, Z would be 9, which is the largest
 one-digit number. 3. 3; $2 + 1 = 3$; This is the
 smallest combination possible since all numbers are
 different. 4. 1; If Y were 0, then Z would equal X,
 and each number stands for a different number.

Page 126, Code Feat

1. 13 2. 3 3. 1 4. 36 5. 6 6. 4 7. 5
 8. 50 9. 25 10. 21 11. 24 12. 9 13. 25
 14. 18 15. 5

Page 127, Favorite Subject

| Student | Reading | Art | Math | Writing |
|---------|---------|-----|------|---------|
| Bill | X | X | X | O |
| Sally | O | X | X | X |
| Bob | X | X | O | X |
| Sue | X | O | X | X |

Page 128, Outside In

1. a. 3, 4, 6, 7 b. 2, 3, 4, 5 c. 2, 4 d. 3, 1, 6
 e. 5 2. a. 3 b. 5 c. 7 3. a. C, H, G, F
 b. C, B, D, G c. D d. H, C, F, A 4. a. H
 b. D c. E

Page 129, Design Codes

1. Baa: C, E, F, H 2. Dokos: A, C, D, H

Page 130, Over Herd

1. Sadie 2. Suzie 3. Moozie 4. Daisy
 5. Bessie 6. Belle 7. Suzie 8. Flossie and
 Lucy 9. Bessie and Daisy

Page 131, Number Sentences

Answers may vary. Suggestions follow, but accept all
 correct student answers.

1. $3 + 5 = 8$; $9 - 7 = 2$ 2. $2 + 4 = 6$; $8 - 7 = 1$;
 $3 \times 5 = 15$ 3. $3 + 7 = 10$; $20 - 9 = 11$; $2 \times 8 = 16$
 4. $4 + 11 = 15$; $60 - 24 = 36$; $6 \times 7 = 42$; $72 + 8 = 9$

Page 132, Number Sense

1. false 2. true 3. false 4. true 5. true
 6. true 7. true

Page 133, Rhyme Tyme

1. two 2. multiply 3. geometry 4. percent
 5. metric 6. divide 7. prime 8. triangle
 9. sum 10. subtract

Page 134, Digit Doings

1. $x = 3$; $y = 6$ 2. $x = 5$; $y = 7$ 3. $x = 9$; $y = 8$
 4. $x = 2$; $y = 6$ 5. $x = 3$; $y = 2$ 6. $x = 1$; $y = 3$
 7. $x = 5$; $y = 7$

Page 135, Letter Perfect

1. T 2. T 3. T 4. F 5. F 6. F 7. T
 8. T 9. T 10. F 11. T 12. T 13. F
 14. T 15. T 16. F 17. T 18. T 19. F
 20. F

Page 136, Number Shuffle

In some cases, the order of these numbers may vary.

1. $2+3+6=11$ 2. $6+3-2=7$ 3. $6+2-3=5$
 4. $6 \times 3+2=20$ 5. $6 \times 2+3=15$
 6. $2 \times 3+6=12$ 7. $6 \times 3-2=16$
 8. $6 \times 2-3=9$ 9. $2 \times 3-6=0$ 10. $6 \times 3+2=9$

Page 137, Letter Logic

$$A + B = CD$$

1. 1 2. 7 or 9 3. 8 or 9 4. 8 5. D can't be 1 because C must be 1, and all the numbers are different.

$$W + X + Y = Z$$

1. 9 2. 4 3. 4 4. 9 5. 6; All numbers have to be different. The smallest sum possible is $1+2+3$.

Page 138, Order Sorter

The correct order is given in each of the following answers.

1. E, C, A, F, B, D, G 2. E, B, A, G, F, C, D, H
 3. C, E, A, F, B, D 4. B, E, A, C, F, D, H, G, I, J

Page 139, Favorite Numbers

| Student | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---------|---|---|---|---|---|---|---|---|---|
| Simon | X | X | X | X | O | X | X | X | X |
| Bonnie | X | O | X | X | X | X | X | X | X |
| Victor | X | X | X | X | X | X | X | O | X |
| Dan | X | X | O | X | X | X | X | X | X |
| Ruth | X | X | X | X | X | O | X | X | X |

Page 140, Number Search

1. 18, 24 2. 25, 45 3. 12, 18, 24, 45 4. 11, 43
 5. 25, 33 6. 47 7. 22, 34 8. 37, 43
 9. 12, 20

Page 141, Logical Strategy

1. D3 or G6 2. X's; D3 or G6 3. C2 or G6

Page 142, Steps in Order

Answers may vary. Suggestions follow, but accept all correct student answers.

1. I, J, E, A, B, F, H, D, G, C, K
 2. E, J, B, G, A, C, D, K, F, I, H

Page 143, Addition and Subtraction Logic

$$W + X = YZ$$

1. 1; $9+8$ is the highest combination possible.
 2. 7; YZ is two digits, and Y can't be 0. 3. 15; Y has to be 1, so YZ is 15. 4. 8; YZ is 15, and $15-7=8$. 5. 9 and 8; YZ is 17. The sum of W and X must be 17.

$$AB - C = C$$

1. AB 2. 1; The highest number C may be is 9, so A has to be 1. 3. even; An even number plus an even number makes an even number, and an odd number plus an odd number also makes an even number. 4. 2

Page 144, Sorting Numbers

1. 23, 29, 31; prime numbers 2. 36, 49, 64, 81; numbers squared 3. 35, 40, 50; multiples of 5

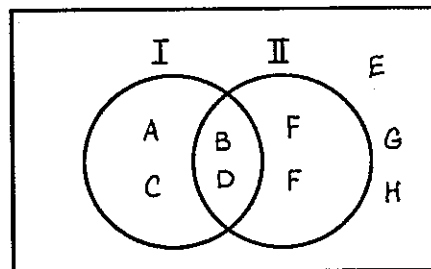
4. 66, 77, 88; multiples of 11 5. 6, 21, 28; triangular numbers 6. 62, 71, 80; beginning with 17, add 9

Page 145, Deductive Logic

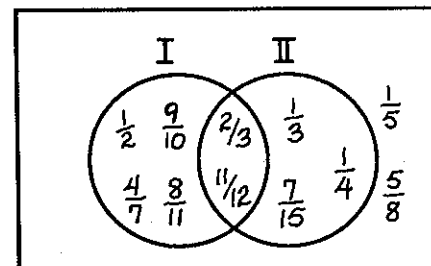
| | Red | Green | Blue | White | Yellow |
|-------|-----|-------|------|-------|--------|
| Akiko | X | X | X | X | O |
| Betty | X | X | O | X | X |
| Clara | X | X | X | O | X |
| Dana | O | X | X | X | X |
| Eve | X | O | X | X | X |

Page 146, Sets and Circles

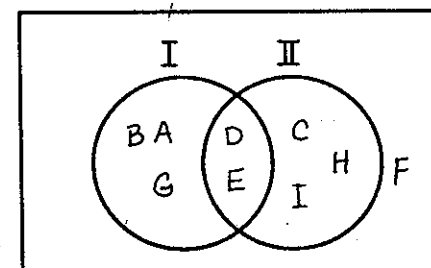
2.



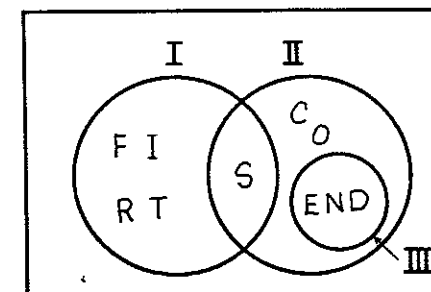
3.



4.



5.



Page 147, Shape Families

1. A, C, F
2. A Plig must have straight sides.
3. B, C, E
4. A Kloppe must have the same shape inside as outside.

Page 148, Number Logic

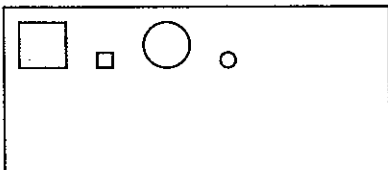
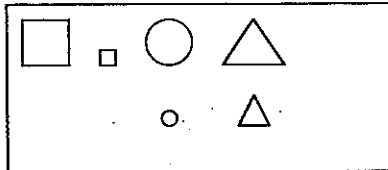
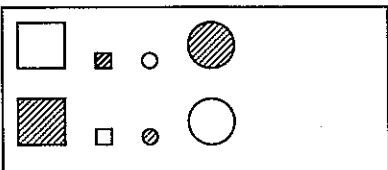
1. true
2. true
3. false
4. false
5. false
6. false
7. false
8. false
9. false
10. false

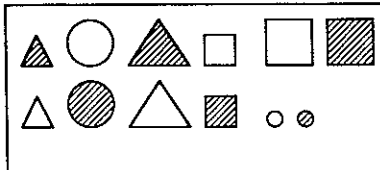
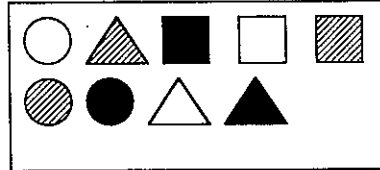
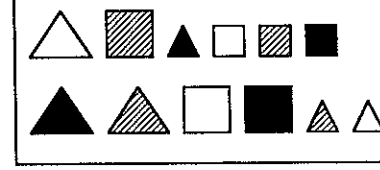
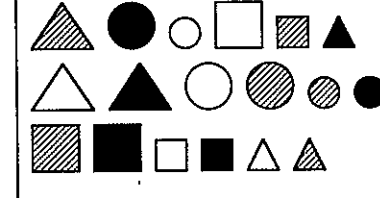
Page 149, Make a Change

Answers may vary. Suggestions follow, but accept all correct student answers.

1. A prime number has exactly **two** distinct factors.
2. The sum of two odd numbers is an **even** number.
3. The **smallest** odd number that can be formed using all five odd digits is 1 less than 13,580.
4. A triangle has exactly **three** sides.
5. The sum of 2 three-digit numbers can contain at most **four** digits.
6. In a division exercise, the dividend is equal to the divisor times the quotient **plus** the remainder.
7. There are exactly **five** prime numbers between 30 and 50.
8. The product of 2 two-digit numbers must contain at least **three** digits.
9. To multiply two fractions, you **multiply** the numerators and multiply the denominators.
10. The product of an odd number and an even number is an **odd** number.
11. Twenty-five percent is the same as **one-fourth**.
12. The product of 2 three-digit numbers must contain either **six** or five digits.
13. Using the fewest number of coins to make 74¢ requires **two** dimes.
14. The square root of an eight-digit number is at most a **four**-digit number.
15. The area formula for a circle **does** use the irrational number π .

Page 150, Logical Shapes

1. 
2. 
3. 

4. 
5. 
6. 
7. 

Page 151, Number Logic

1. $a=5, b=4$
2. $a=5, b=4$
3. $a=6, b=2$
4. $a=7, b=5$
5. $a=5, b=4$
6. $a=7, b=9$
7. $a=0, b=5$
8. $a=5, b=6$

Page 152, Mystery Words

1. NUMBER
2. EQUAL
3. AVERAGE
4. AREA
5. LOGIC

Page 153, Number Juggling

In some cases, the order of these numbers may vary.

1. $12 + 4 - 3 = 13$
2. $4 \times 3 - 12 = 0$
3. $12 - 4 - 3 = 5$
4. $4 \times 3 + 12 = 24$
5. $12 + 3 + 4 = 8$
6. $12 + 3 - 4 = 0$
7. $12 + 4 \times 3 = 9$
8. $3 \times 4 + 12 = 1$
9. $12 + 4 + 3 = 1$
10. $12 \times 3 + 4 = 9$
11. $12 \times 3 - 4 = 32$

Page 154, Letter Logic

1. $2 \times 4 = 8; 4 \times 2 = 8$
2. $12 - 5 = 7$
- 3.-11.

| A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|
| 4 | 8 | 2 | 7 | 6 | 1 | 9 | 5 | 3 |

Page 155, Attributes

1. 1 2. 1 3. 4 4. 2 5. 2 6. 5 7. 8
8. 8 9. 7 10. 3 11. 3 12. 6

Page 156, Deductive Logic

| | 89 | 87 | 85 | 84 | 81 |
|--------|----|----|----|----|----|
| Maria | X | X | O | X | X |
| Tulsie | X | X | X | O | X |
| Ben | X | O | X | X | X |
| Harry | X | X | X | X | O |
| Kim | O | X | X | X | X |

Page 157, Logical Conclusions

1. a. false b. true c. can't tell d. can't tell
2. a. true b. false c. can't tell d. true
e. true f. can't tell 3. a. false b. true
c. false d. false e. can't tell f. false

Page 158, Deductive Reasoning

1. a. yes b. no c. yes d. yes e. no
2. a. no b. yes c. yes d. yes e. no
3. a. yes b. yes c. yes d. no e. no
f. yes g. no h. yes i. yes 4. a. no
b. yes c. yes d. no e. yes f. no g. yes
h. yes i. yes